REMARKS

The present invention is directed to the extension of the life of lubricating oil in internal combustion engines equipped with Exhaust Gas Recirculation (EGR) systems and to the extension of the useful life of EGR equipped internal combustion engines. This is accomplished by ensuring that the EGR streams which are recycled to the intake manifold are of reduced entrained acidic component content. The entrained acidic components in the exhaust gas which is recirculated are removed by use of a chemical filter which interacts with and neutralizes the acidic components. The chemical filter is fitted into the EGR stream at a point down stream of the EGR heat exchanger/cooler so that the chemical filter is operating on a cooled EGR stream, a stream which, because of its being cooled has a relative humidity of about 20% or more, preferably about 50% or more, preferably the cooling is to be temperature just slightly above the dew point, the dew point being the temperature at which air is saturated with moisture, i.e., a relative humidity approaching if not actually at 100%.

The Examiner rejects claims 4, 8, 9 (sic), (12) and 16 under 325 USC § 112 second paragraph as being indefinite. Although those claims provide for the use of the devices of claims 1, 5, 9 and 13 they do not set forth any steps involved in the process or method and it is unclear what method or process is intended to be encompassed. He also rejects claims 4, 8, 9 (sic), (12) and 16 under 35 USC § 101 as being use claims without setting forth any steps in the process which is an improver definition of a process.

Claims 4, 8, 12 and 16 have been amended to recite the specific steps which are followed in practicing the process/method as well as what the process achieves.

Claim 4 has been amended to recite that the process comprises placing a chemical filter in an EGR stream and cooling the EGR stream to a temperature to increase the humidity using heat exchanger/cooler located upstream of the chemical filter whereby acidic components in the EGR stream are removed by the chemical filter before the EGR stream is introduced into the intake manifold.

Claims 8, 12 and 16 have been similarly amended to recite the appropriate process steps.

It is believed these amendments to claims 4, 8, 12 and 16 address and overcome the Examiner 35 USC § 101 and 112 paragraph 2 rejections.

All of the claims have been amended to correct formal errors and where deemed necessary or desirable to recite additional clarifying language.

New claims 17 and 18 recite that the cooling of the EGR stream is to a temperature just slightly above the dew point. Support for these claims is found in the specification at page 9, paragraph [0024].

The Examiner rejects claims 1, 4, 5 and 8 under 35 USC § 102(b) as anticipated by Freesh, USP 4,356,806.

The Examiner argues that Freesh discloses a device to extend the useful life of a lubricant in an EGR equipped engine comprising a chemical filter placed in the EGR stream, a chemical filter placed just before the intake manifold and a heat enhancer/cooler placed upstream of the chemical filters to reduce the temperature and increase the relative humidity.

Applicants respectfully traverse that rejection.

It is believed that the Examiner is mischaracterizing the Freesh disclosure and invention.

Freesh is not directed to a method or device for extending the useful life of a lubricant. In fact, Freesh is silent as to the engine lubricant. Rather, Freesh is believed to be directed simply to the exhaust gas recirculation system as a way to reduce CO emissions and improve mileage (column 1, lines 29-33; column 4, lines 35-43).

Further, Freesh does not teach, suggest or imply that the "filters" used are chemical filters as argued by the Examiner.

Review of Freesh reveals that the filters are actually particulate filters, not chemical filters. They function in Freesh to remove particles from the recirculated gas, e.g., carbon, soot, etc. (column 3, lines 4-5, column 3, lines 61-68, and column 4, lines 1-2). They also serve to redistribute any condensed water back into the recirculated gas as fine droplets before the gas is introduced into the intake manifold (column 4, lines 4-10). Breaking the condensed water into fines particles more evenly distributed in the recirculated gases helps avoid engine hesitation or surge.

Thus, nothing in Freesh teaches or suggests or implies the use of a chemical filter in an EGR system to remove acidic chemical components from the recirculated gas, thereby prolonging the life of the lubricating oil and of the engine itself.

The Examiner rejects claims 2, 3, 6 and 7 under 35 USC § 103(a) as obvious over Freesh. The Examiner argues that, while Freesh does not disclose relative humidity, it would have been obvious at the time the invention was made to optimize the humidity through routine experimentation and that applicants have not shown that the recited humidity ratio are particularly advantageous or serve a particular purpose.

Applicants respectfully traverse this rejection.

Because Freesh does not in any way teach, suggest or imply that the filters are chemical filters, the control of humidity in Freesh is irrelevant and the question as to whether one of skill in the art would optimize the humidity on following Freesh is similarly irrelevant. In Freesh there is nothing to suggest whether controlling humidity is important or not. One of ordinary skill, looking at Freesh and its teaching that the filter is a particulate filter to remove particulates and also functions as a way to redistribute condensed water droplets back into the recirculated gas would be led rather to the conclusion that efforts should be made to reduce the amount of water vapor (i.e., humidity) in the gas, not that it is desirable to have high humidity.

Regardless of whether Freesh does or does not teach humidity control, the absence of any teaching or suggestion in Freesh of the use of chemical filters in the EGR system renders Freesh irrelevant as an obviousness reference.

The Examiner rejects claims 9-16 under 35 USC § 103(a) as obvious over Freesh in view of Rohrbach et al.

The Examiner repeats his argument that Freesh discloses a device to extend the useful life of a lubricant in an EGR equipped engine comprising an optional chemical filter (41) in the EGR stream, a chemical filter (42) placed just before the intake manifold, a heat exchanger/cooler (40) upstream of the chemical filter to reduce temperature and increase humidity. Freesh does not disclose an oil filter. To overcome this the Examiner relies on Rohrbach which discloses an oil filter capable of neutralizing acids.

Applicants respectfully traverse this rejection.

As previously indicated, Freesh is not directed to extending the useful life of lubricant oil or to a diverse to extend the useful file of lubricant oil. Rather, Freesh is directed solely to an EGR device for recycling exhaust gas so as to reduce CO emissions and improve fuel mileage, neither of which are associated with extending lubricant oil life or engine life.

Freesh does not teach, suggest or imply putting a chemical filter in the EGR system. Rather, Freesh puts two standard particulates filters in the EGR stream to trap carbon or other particles and to redistribute droplets of condensed water back into the EGR stream so as to avoid stalling, hesitation or surge (column 4). The filters taught by Freesh are particulate filters and not chemical filters. Fresh does not teach, suggest or imply that his filters are chemical filters or could be chemical filters or that the life of lube oil can be extended by employing a system in which an EGR stream is cooled and then passed through a chemical filter so as to reduce/remove the acid components present in the cooled EGR exhaust gas stream.

Freesh does not practice humidity control nor does he teach, suggest or imply that the level of humidity should be controlled or that the passage of an EGR stream having water present therein expressed as % relative humidity through a chemical filter will result in the extension of the useful life of lubricating oil and the useful life of engines fitted with EGR systems.

All Freesh teaches is a basic EGR system. He does not teach, suggest or imply any way in which the system can or should be modified so as to effect an extension of the useful life of either the lube oil or the engine fitted with an EGR system.

Because Freesh fails as a primary reference, the teaching by Rohrbach et al of a lube oil filter, for use in lubricating oil system, which is capable of neutralizing acids in

the engine oil does not overcome the deficiencies of Freesh and does not even when combined with Freesh result in a teaching or suggestion of the present invention.

The present specification has been amended at paragraph [0016] and [0024] to incorporate therein the contents of original claims 2, 3, 6, 7, 10, 11, 14 and 15.

It is requested that the Examiner reconsider this case in light of the amendments made to the specification and the claims, that he withdraw the rejections, allow the claims as amended and pass the case to issue in due course.

Respectfully submitted,

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[X] Pursuant to 37 CFR 1.34(a)

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July 12, 2004